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APPARATUS FOR PLACING TEST LOTS OF INSECTS WITHIN PARCELS OF  
STORED TOBACCO DURING FUMIGATION EXPERIMENTS

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Introduction

During the conduct of fumigation experiments regarding the control of insects infesting cured tobacco, it became necessary to devise some method of placing test lots of insects within hogsheads, cases, and bales of stored tobacco in order to determine the percentage of mortality of such insects, at specified depths, resulting from the fumigation treatments. A review of the literature disclosed that various methods had been used by research workers in similar lines of endeavor but that none of these methods were completely satisfactory. After considerable experimentation the steel spike described in this circular was developed and has proved to be satisfactory for the purpose intended. It is believed that this spike, or modifications of it, could be used to advantage in obtaining data upon the percentage of mortality resulting from fumigation, or other treatments, of many kinds of insect-infested stored products.

Description and Cost of Apparatus

This spike (figure 1) consists of sections of stainless steel, each three-fourths of an inch in outside diameter and  $2\frac{1}{2}$  inches in length, except the top section, which is 3 inches long. When the sections are assembled the total length of the spike is 15 inches. The top end of each section is cut down one-half inch to a diameter of three-eighths inch and threaded with a die. The bottom end of each section is drilled out to three-eighths inch and the threads are cut to a distance of one-half inch in the opening. This leaves a receptacle in each section 1 inch long and three-eighths inch in diameter for accommodating the lots of insects used for tests. The upper and lower sections of the spike contain no compartment for insects, but the upper section has a small steel rod inserted crosswise near the top to facilitate handling and to assist in removing the device from the tobacco. The lower end of the spike is pointed so that it will pierce the tobacco satisfactorily. Four holes are drilled through the wall of the spike into each compartment near the bottom but clear of the threaded portion of the adjoining section. With the holes located in the lower half of the compartment, the gas must penetrate the maximum depth to reach the test insects. A hole was drilled through the solid section bearing the tip of the spike in order that a small steel rod may be used when necessary

to facilitate the unscrewing of the first compartment. The spike can be made any length or size desired by adding the proper number of sections or by increasing the dimensions of each. In order to minimize the displacement of tobacco, it is desirable to use a spike with as small a diameter as possible for accommodating the test insects. Stainless steel proved the most satisfactory metal for use in this apparatus, since it would enter the tobacco with a minimum of displacement and would not corrode after use in the moist stored tobacco.

The cost of the steel spike described herein was about \$4; however, the cost in different localities would depend largely upon labor charges.

### Use of Steel Spike

Test lots of the stages desired of the cigarette beetle (Lasioderma serricorne Fab.) and the tobacco moth (Ephestia elutella Hbn.) are placed in the sections of the spike in perforated gelatin capsules or in small screen cages. The spike is prepared in the laboratory, the sections being assembled as the capsules or small cages are placed inside. A mallet made of hard rubber (which will not batter the top end) is used to drive the spike into the packed tobacco.

This apparatus has been used extensively during the past year in atmospheric fumigation experiments and in experiments in partial vacuum. It is satisfactory for use in all grades and types of cured tobacco, and only a small quantity of the tobacco leaf is destroyed by driving the spike into the tobacco. The smooth surface of the steel permits the spike to enter the tobacco with little chance for making openings that would permit the gas to reach the insects without penetrating the tobacco.

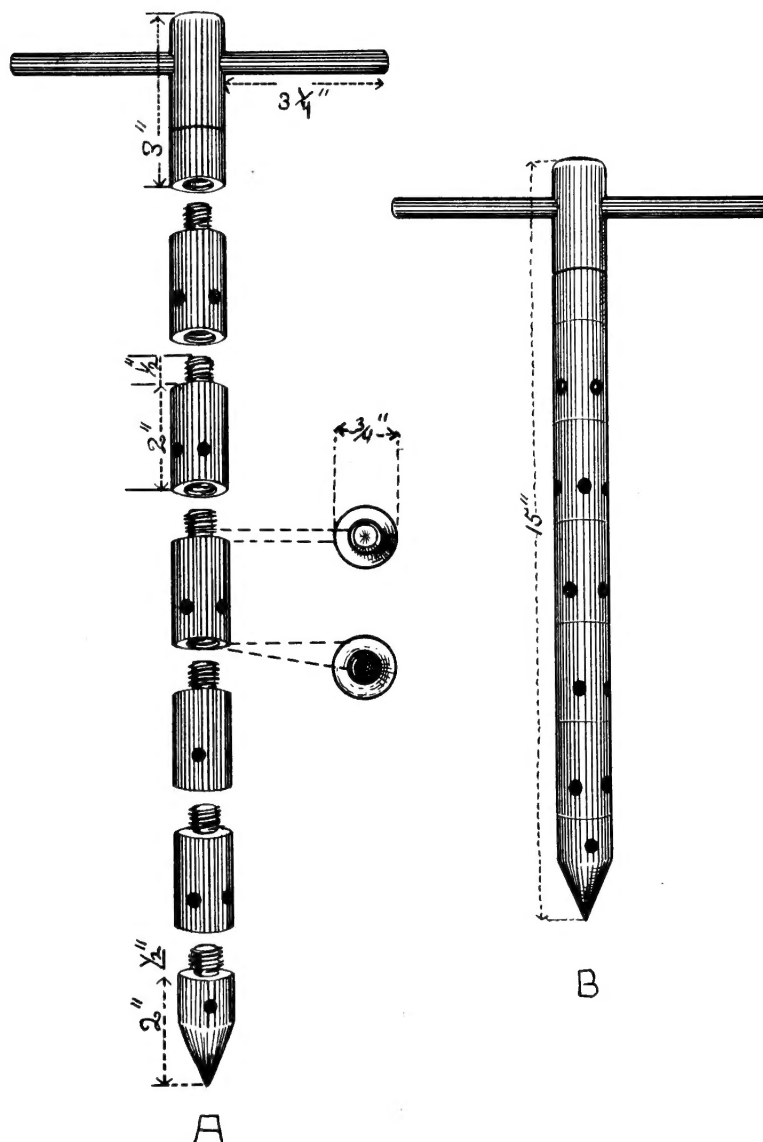


Figure 1.--Steel spike, 15 inches long and three-fourths of an inch in outside diameter, consisting of sections which have been drilled out so that each section (except those at the ends) contains a compartment for the accommodation of test lots of insects. Four holes are drilled through the wall into each compartment to enable the fumigant to reach the insects. (Drawing by Mrs. Mary F. Benson.)

